**IN THE DRAWINGS:**

Please amend the drawings as indicated in the attached Request for Approval of Drawing Changes.

## REMARKS

By this amendment, claims 2, 3, 5, and 9-11 are canceled without prejudice or disclaimer of the subject matter thereof, claims 1, 4, and 6-8 are amended, and claims 12-15 are added. Moreover, the specification is amended to more appropriately describe the invention. Applicant has further amended the drawings to more appropriately illustrate the subject matter disclosed in the specification. Applicant submits that no new matter is added by the amendment. Claims 1, 4, 6-8, and 12-15 are currently pending.

In the Office Action, the Examiner objected to the specification for failure to include an Abstract and for other informalities. The Examiner objected to claims 1-11 because of a number of informalities. Furthermore, the Examiner rejected claims 1-11 under 35 U.S.C. § 112, second paragraph as indefinite, and under 35 U.S.C. § 102(b) as anticipated by *Douglas*, U.S. Patent No. 3,325,659. These objections and rejections are respectfully traversed for the following reasons.

To facilitate arrangement of papers for printing or copying, Applicant has provided a substitute specification to correct informalities and have further provided an Abstract on a separate sheet. Furthermore, Applicant provides a marked up version of the substitute specification showing all the changes to the specification of record. The substitute specification includes no new matter. Thus, Applicant submits that the Examiner's objection to the specification is moot and should be withdrawn.

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In addition, Applicant submits herewith a Request for Approval of Drawing Changes so that the drawings may properly correspond to the invention as described in the substitute specification. No new matter has been added by the drawing changes.

The Examiner rejected claims 1-11 under 35 U.S.C. § 112, second paragraph for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Particularly, Applicant has amended the claims so that those claim elements identified by the Examiner as unclear, are now recited with clarity. For at least this reason, Applicant submits that pending claims 1, 4, 6-8, and 12-15 recite the claimed invention in a clear and distinct manner. Thus, the Examiner's rejection under 35 U.S.C. § 112, second paragraph is moot and should be withdrawn.

To properly anticipate Applicant's claimed invention under 35 U.S.C. § 102(b), each and every element of the claim at issue must be found, either expressly described or under principles of inherency, in a single prior art reference. Furthermore, "[t]he identical invention must be shown in as complete detail as is contained in the...claim." See M.P.E.P. § 2131 (8th ed., Aug. 2001), quoting *Richardson v. Suzuki Motor Co.*, 868 F.2d 1126, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). Finally, "[t]he elements must be arranged as required by the claim." M.P.E.P. § 2131 (8th ed. 2001), p. 2100-69.

Independent claim 1 recites a combination of elements including, among other things, a plurality of outlets for connecting external controls and the electric voltage, wherein the outlets are positioned so that wiring may avoid kinking, stretching, and an impairment of wiring resistance.

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In contrast, *Douglas* fails to disclose a plurality of outlets for connecting external controls and the electric voltage as recited in the claim. Instead, *Douglas* teaches a concept related to an explosion proof hand held instrument. *Douglas* describes this hand-held instrument as a power drill, where a battery that is fully enclosed within the shaft of the drill supplies power for operating the drill. *Douglas* teaches that the battery connects to a mounting block, having a single pair of terminals that connect to a motor. In particular, both the mounting block and battery are inside the drill housing. *Douglas* fails to teach or describe a structure having a plurality of outlets for connecting external controls and the electric voltage, as recited in claim 1. Because *Douglas* does not teach every element of claim 1, it follows that *Douglas* does not anticipate the claim. For at least this reason, Applicant submits that claim 1 is allowable and the rejection under 35 U.S.C. § 102(b) should be withdrawn.

Because each of claims 4, 6, 7, 8, and 12-15 depend either directly or indirectly from independent claim 1, Applicant submits that these claims are allowable for at least the same reasons given above based on this dependency.

In view of the foregoing amendments and remarks, Applicant respectfully requests the reconsideration and reexamination of this application and the timely allowance of the pending claims.

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Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER, L.L.P.

Dated: December 23, 2002

By: _____
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Application Number: 09/807,510
Filing Date: April 16, 2001
Attorney Docket Number: 8379.0002-00

**APPENDIX TO AMENDMENT OF DECEMBER 23, 2002**

**Version with Markings to Show Changes Made**

Amendments to the Specification

Please enter the substitute specification filed herewith pursuant to 37 C.F.R. 1.125. Applicant submits that entry of the substitute specification does not introduce new matter. A marked-up version of the substitute specification showing all of the changes to the originally filed specification is enclosed.

Amendments to the Claims

1. (Amended) An anti-deflagrating [Anti-deflagrating] operating actuator, [adapted to operate in an environment with explosion risks, characterised in that both components that are subjected to electric voltage, and a gear reducer, and a motion transmission mechanism and/or a mechanism transforming rotary motion into linear motion, are] integrally protected against deflagration, said actuator comprising:

an external housing formed in a shape that outlines internal parts of the actuator;

a motor located within the external housing and connected to an electric power source;

at least two brackets located within the external housing for supporting the motor;

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a gear reducer located within the external housing and connecting to at least one of an external drive device and the motor, wherein the gear reducer performs one of linear motion transmission or angular motion transmission;

a plurality of outlets for connecting external controls and the electric voltage;

wherein the outlets are positioned on the external housing so that wiring may avoid kinking, stretching, and impairment of wiring resistance, and

wherein an area of free volume adjacent to the brackets is uniform.

4. (Amended) The anti-deflagrating [Anti-deflagrating] operating actuator according to [Claim] claim 1, [characterised in that] wherein the outlets connect at least one of [mechanical parts that transmit mechanical power are placed] an electrical power source, external controls, [in ergonomic positions with reduced encumbrance] and a mechanical drive that transmits mechanical power to the gear reducer.

6. (Amended) The anti-deflagrating [Anti-deflagrating] operating actuator according to [Claim 1, characterised in that an] claim 1, wherein the angular motion transmission of the gear reducer is direct.

7. (Amended) The anti-deflagrating [Anti-deflagrating] operating actuator according to [Claim 5, characterised in that] claim 1, wherein one end of an electric connection cable is secured to the external housing through a cable-pressing device [(21) equipped with] having a [suitable] securing mechanism and an anti-deflagrating operating ring nut.

8. (Amended) The anti-deflagrating [Anti-deflagrating] operating actuator according to [Claim 5, characterised in that a section] claim 7, wherein another end of

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the electric connection cable [that] connects the actuator to at least [up to a first shunting box] one switch that is contained in a [suitable] metallic tear-preventing sheath[,] reinforced with [PCT] PVC and [with] having a mechanical seal.

12. (New) The anti-deflagrating operating actuator according to claim 1, wherein the external housing further comprises:

an upper half shell; and

a lower half shell.

13. (New) The anti-deflagrating operating actuator according to claim 12, wherein the upper half shell includes a flange and the lower half shell includes a cylindrical mantle and a circular plug.

14. (New) The anti-deflagrating operating actuator according to claim 13 wherein a first threaded coupling having left-handed threading is located between the cylindrical mantle and the flange; and

a second threaded coupling having right-handed threading is located between the cylindrical mantle and the circular plug.

15. (New) The anti-deflagrating operating actuator according to claim 1, wherein the area of free volume is uniform because the area increases in size or is filled with dense material.

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# SUBSTITUTE SPECIFICATION

# ANTI-DEFLAGRATING OPERATING ACTUATOR

## BACKGROUND

### Field

[001] The present invention refers to an actuator adapted to operate in environments [with explosive] having a combustible atmosphere such that [is present in such an amount as to require] special precautions are required when using electric, pneumatic, or mechanical [apparata.] devices.

### Related Art

[002] [An actuator in] In an environment with explosion risks, an actuator must be able to withstand [,] the explosion force that is characteristic for any given gas or mixture according to the degree of risk associated with the type of atmosphere in which the actuator itself operates.[, the explosion force that is characteristic for any given gas or mixture.]

[003] [According to the known prior art, there are] Conventional methods provide several deflagration-protecting procedures for providing an actuator, [each one of which being aimed] where each procedure aims to insulate [the] actuator components that are prone to explode. In [the specific case to which the present invention refers, the protection from] some cases, deflagration [is guaranteed] protection is realized by encapsulating [the] critical actuator parts [into] in a suitable vessel. The suitable vessel is further equipped with outlets [both] for connecting mechanical parts that are used for the connection of mechanical parts [transmitting the] that transmit mechanical power and [for the] outlets used for connecting at least one of an electric supply and control connections.

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[004] The geometric shape of the vessel, the volume ratio occupied by the internal components with respect to the internal volume of the housing containing them, and the degree of uniformity of the free volume [,] are some of the design variables whose optimisation affects both the static response and the dynamic response of the actuator to an explosion. With respect to a possible detonation phenomenon, it is good practice to keep the free volume uniform inside the vessel, thereby avoiding the occurrence of precompression phenomena [with following] that follows detonation. [In the majority] Generally, however, this practice allows realization of [times,] a device [results] that is scarcely appreciated [due to] because of excessive overall dimensions [with problems in] that impair placing [it above all where the ]the device in locations having limited available space. [is reduced.]

## [Object] SUMMARY

[005] An object of the present invention is [solving] to solve the above prior-art problems by providing an anti-deflagrating operating actuator, adapted to operate in an environment that is classified - according to the existing standards [currently in force -], as having [the] a maximum explosion risk. [, such] An actuator [providing] as such comprises the following [features]:

- [both the] components [subjected to] supplied with an electric voltage, [and the] a gear reducer, and [the] at least one of a motion transmitting mechanism [and/or the] and a mechanism transforming the motion from rotary to linear [one - in case of an actuator whose output motion is of the linear type -], are integrally protected against deflagration;
- [the] an external housing that optimally [coats] protects the apparata contained therein, [reproducing the outline of the contained parts, guaranteeing] and is formed

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such that the shape of the housing outlines the internal parts, guarantees final reduced volume and weight, [and keeping the] keeps an internal free volume [thereinto] uniform, [guaranteeing a reduced or even absent] and guarantees to reduce or eliminate a detonating effect;

- [the] ergonomically placed outlets for connecting [the] mechanical parts [transmitting] that transmit the mechanical power [are ergonomically placed,] and guaranteeing [an] easy actuator installation next to walls;
- [the] outlets for connecting at least one of the electric supply and control connections [are placed in such a way as], wherein the outlets are positioned so they do not [to] interfere with the wiring resistance [, thereby avoiding its] by kinking and [the following] stretching [thereof;] the electrical wiring;
- [in case of] an angular-operating actuator [,] in which the motion [transmission is direct, and is obtained through] is transmitted directly to an external user via an intermediate connection shaft [from the] and a reducer shaft [contained into] located in the housing.[, to the user placed outside.]

[006] The above and other objects and advantages of the invention, as will appear from the following description, are obtained by an actuator as claimed in [Claim] claim 1. Preferred embodiments and non-trivial variations of the present invention are claimed in the dependent [Claims.]claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

[007] The present invention [will be better] is described [by] below with reference to some preferred embodiments. [thereof,] These embodiments are given as [a] non-limiting [example,] examples with reference to the enclosed drawings. [, in which:] In the drawings:

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[008] [Figure] Fig. 1 is a schematic side view of an anti-deflagrating operating actuator of the angularly operating type [; and] consistent with methods and systems of the present invention; and

[009] [Figure] Fig. 2 is a schematic side view of an anti-deflagrating operating actuator of the linearly operating type consistent with methods and systems of the present invention.

## DETAILED DESCRIPTION

[010] An angular [The angularly] operating actuator [of Fig. 1 is substantially composed of an ]30, as shown in Fig. 1, includes a housing 35 having a plug 3, a sealing ring 4, an upper half-shell [1 whose] 5, a threaded flange 6, a pin 8, rolling bearings 9, securing rings 12, rings 13, brackets 14, threaded pins 16, electric wiring 20, a cable pressing device 21, a cable section 22, outlets 70a-70d, and a servomotor SM.

[011] Housing 35 includes a lower half-shell 1 and an upper half-shell 5. Lower half-shell 1 is formed on a lower portion of housing 35 and includes a cylindrical mantle 2. [, that] Cylindrical mantle 2 is smooth and free from interruptions, and is equipped at both ends [thereof] with [an] internal threading [section] sections 2a and 2b [with an] of adequate [length.] lengths, respectively.

[012] The [opposite] lower end of [the] cylindrical mantle 2 having internal threading section 2b, is closed [through] by a plug 3. [with] Plug 3 is of a suitable thickness (s3) that is able to withstand, without distortions, [the.] a deflagration-induced force or [anyway the] a design pressure to which [the] actuator 30 is subjected. [; an hole or the holes that are necessary for the outside connection of the] Plug 3 provides at least one hole used for connecting electric wiring 20 [,] or [the] other related [connection, is/are possibly obtained on such plug 3. Next to the threaded coupling, a sealing] connections. Sealing ring 4 is placed [. In a further embodiment

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of the] next to internal threading section 2b. Alternatively, actuator [, the] 30 may be configured so that cylindrical mantle 2 is [integral with the plug 3. In both cases, they are made of an aluminium] integrated with plug 3. This alternative configuration does not, however, use internal threading section 2b. Both cylindrical mantle 2 and plug 3 comprise an aluminum alloy melt used, for example, in making shell casts.

[013] [An upper] Upper half-shell 5 [,] is an upper portion of actuator housing 35, and is also made of an [aluminium] aluminum alloy melt used, for example, in making shell casts. [, is coupled with the] Upper half-shell 5 couples with lower half-shell 1 through [a] threaded flange 6. [, having] Threaded flange 6 includes an external threading 6a [. This flange 6 operates as a] and is used to support [for the] servomotor SM. [body.]

[014] [The] A plane section of the side surface of upper half-shell 5 [is equipped with] includes a threaded through [-hole that is made of a plane section of the side surface and is coupled with a very thick] hole 45. A cylindrical sleeve 40 [through the threaded end. Next to the] is very thick and coupled to upper half-shell 5 via threaded [coupling,] through hole 45, and a sealing ring [is placed.](not shown).

[015] [This] Cylindrical sleeve 40 is connected to [a] pin 8. Pin 8 is made of stainless steel [, such pin 8 transmitting the] and transmits twisting torque [,] through [the] rolling bearings 9, which are arranged [at the] on two opposite ends of sleeve 40[; these], respectively. Rolling bearings 9 [are placed with] have suitable coupling tolerances and are secured through resilient rings 12. [The] Rolling bearings 9, [in addition to ensuring the axial centering of the] ensure that stainless steel pin 8 [, are ]is positioned along a central axis. Rolling bearings 9 are further able to withstand [the possible] any loads to which [such] pin 8 is subjected. [At least

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two] The positioning of pin 8 is further secured via rings 13, [inserted onto the] which are located on pin 8 [, are sandwiched] between pin 8 and sleeve 40.

[016] [The pin] Pin 8 is [the outlet axis, being] equipped with a [seat shaped as a] prism [, and is adapted to transfer, the twisting torque by means of the prism-]shaped seat 11, [integral to the] which is set in a prism shaped groove integrated into servomotor SM. As a result, pin 8 is adapted to transfer twisting torque to [, and perfectly matching the above-described prism-shaped groove.]

[017] [The servomotor] Servomotor SM is [projectingly] secured to [the] threaded flange 6 [, this latter one being] by aligning the outlet axis of servomotor SM with the transmission axis of pin 8. Threaded flange 6 is equipped with a suitable groove for sliding the [servomotor body when assembling, by aligning its own] body of servomoter SM along the outlet axis. [with the transmission axis through threaded fixings; two further brackets 14,] Brackets 14 are integral with [the] flange 6 [, allow stiffening the] and enable a secure coupling between servomotor SM and [housing,] upper half-shell 5. Brackets 14 include through [suitable holes obtained at the end of each bracket 14] holes on each end respectively, that enable coupling to [secure the] threaded pins 16 [that are integral with the] integrated on servomotor SM. Once [The fact of having made the] servomotor SM [integral with the] is coupled to flange 6 [allows facilitating the assembling operation with the above-described], lower half-shell 1 [. In fact, once having assembled the servomotor SM] is coupled to [the respective flange 6, both] half-shell [1 and plug 3 are screwed; and after that, as last operation, the electric] 5 via external threading 6a. Moreover, plug 3 is coupled to half-shell 1 via internal threading 2b. Electric connection cable 20 is secured [through the] to cable [-]pressing device 21 [, this latter one being equipped with a suitable] having an anti-deflagrating [operating] securing ring nut. [The electric.] Electric cable

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section 22 [that] connects the actuator [at least till the first shunting box SD is contained into] to a switch SD, which is enclosed in a [suitable] metallic tear-preventing sheath coated with [PVC] polyvinyl chloride (PVC) and [with] a mechanical seal (not shown). Alternatively, brackets 14 may be permanently integrated with flange 6 via a melting process of an aluminum alloy shell used, for example, in making shell casts.

[018] Outlets 70a-70d facilitate the connection of at least one of an electrical power supply and control connections to actuator 30. Outlets 70-70d are strategically located in ergonomic positions on housing 35, to enable actuator 30 to be located near walls.

[019] Battery B supplies electric power to actuator 30 via switch SD. Electrical cabling 55 connects battery B to actuator 30. Switch SD facilitates the transmission of electrical power to actuator 30, and in particular, to servomotor SM via electric cable section 22. By opening or closing a circuit (not shown) contained therein, switch SD enables battery B to provide electrical power to actuator 30.

[020] Lower [The housing coats the servomotor placed inside it by employing a thickness increase next to the brackets 14 or by adding a volume of suitably dense material 23 where the housing volume that has remained free, particularly in the] half-shell 1 [, is ]and upper half-shell 5 comprise actuator housing 35. Volume material 23 is contained in a non-uniform [with respect to the remaining volume, above the threshold over which uncontrolled detonation phenomena can occur. It is clear that by adding the volume of ]area of actuator housing 35 located adjacent to brackets 14 located on either side of servomotor SM. Volume material 23 optimizes the dynamic response of actuator 30 resulting from deflagrations. Volume material 23, [it is possible] thus enables monitoring of an explosion that is external to [monitor the detonation by optimising the dynamic] actuator [response to deflagrations.] housing 35. Explosion

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monitoring is realized because the level of denseness of volume material 23 is above a threshold at which uncontrolled detonation phenomena occurs.

[021] [The linearly operating actuator of Fig. 2 is equipped with ] Fig. 2 illustrates a linearly operating actuator 60 consistent with methods and systems of the present invention. In addition to the components of actuator 30 illustrated in Fig. 1, linearly operating actuator 60 includes a box ST [transforming the motion from rotary to linear one. This box ST is contained within the housing of the above-described type, being integral with the], a cylindrical sleeve 50, a flange 43, a pin 44, sliding bearings 45, a threaded through hole 47, and outlets 70a-70d. Box ST is located adjacent to servomotor SM [body.], and transforms rotary motion into linear motion. Box ST is coupled to servomotor SM via pin 8.

[022] A [very thick cylindrical] plane section of flange 43 includes threaded through hole 47. Cylindrical sleeve 50 is very thick and coupled [with the] to flange 43 [through] via the threaded [end. This] through hole. Cylindrical sleeve 50 is connected to [a pin 44 made of stainless steel, equipped with a linear translation motion and going out of the motion-transforming box ST through the sliding] stainless steel pin 44. Sliding bearings 45 are arranged on opposite sides of cylindrical sleeve 50 and ensure that pin 44 is positioned along a central axis. Sliding bearings 45 [arranged along the sleeve 50.] further enable box ST to transform rotary motion of input via pin 44 into a linear motion at pin 8.

[023] [Both the final volume and the final weight of the angularly and linearly operating] As mentioned above, each of actuators [are optimised; the] 30 and 60 as illustrated in Figs. 1 and 2, respectively, further include outlets [for connecting mechanical parts that transmit the mechanical power are placed in ergonomic positions, guaranteeing an easy actuator installation] 70a-70d that are ergonomically positioned on their respective housings so that

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actuators 30 and 60 may be installed next to [the walls; the outlets for connecting the] walls. Outlets 70a-70d are used to connect external mechanical components used for transmitting mechanical power, and at least one of electric supply and control connections [are placed in order not to impair the wiring efficiency, avoiding the kinking and following stretching thereof; in case of the angularly operating actuator, the] so that wiring efficiency is not impaired due to kinking and stretching of the electrical wiring. In actuator 60, the rotary or angular motion [transmission is direct, being obtained] is directly output to an external user on pin 44 through an intermediate connection [shaft from the] realized via a reducer shaft [,](not shown) contained [inside the] within actuator housing [, to an external user] 65. []A simplified actuator is [thereby obtained as], therefore, realized, which obviates the use of a number of intermediate linear motion transmission mechanisms seen in conventional devices.

[024] Figs. 1 and 2, illustrate simplified actuators with regards to the number of transmission components [, having done] that are used. These simplified actuators 30 and 60 operate without [the use of] intermediate linear motion [transmissions] transmission mechanisms such as [the] a rack, [this latter one being] which is widely used in [the prior art.] conventional devices.

[025] [A further novelty obtained by the actuator of the present invention is that the two] As shown in Fig. 1, threaded couplings 2a-6a and 2b-3b are located between cylindrical mantle 2 and [, respectively,] flange 6, and cylindrical mantle 2 and circular plug 3 [, are realised through] respectively. Threaded coupling 2a-2b has a left-handed threading SN [and ](not shown) and threaded coupling 2b-3b has a right-handed threading DS (not shown). Threaded couplings 2a-6a and 2b-3b enable the assemblage of half-shells 1 and 5 into housing 35, for example, by rotating cylindrical mantle 2 with respect to flange 6 and plug 3 while avoiding

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wiring impairment through kinking and stretching. In this manner, the actuator assembly can comply with a simplified procedure divided into several mechanical and automatic steps, which are performed without confronting unidirectional threaded elements. This actuator assembly may be used with simple rotation steps of the cylindrical trunk and the translation of plugs 3 and 43, respectively. [With such arrangement, it is possible to assemble the two half-shells 1 and 5 by simply rotating the cylindrical mantle 2 with respect to the plug 3 and the flange 6 with the advantage of removing the risk of kinking and stretching the electric wiring. In such a way, the assembly can strictly comply with a simplified procedure divided into several mechanical and automatic steps, having done without the subjective handling intervention with unidirectional threaded elements.

An assembly of this type is available to be used in line with simple rotation steps of the cylindrical trunk and the only translation of the two plugs.

In a further variation of the invention, the brackets 14 that slide and support the motor are integrally obtained with the flange 6 through melting in an aluminium alloy shell for casts.]

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